



An Energy Efficiency Workshop & Exposition  
Kansas City, Missouri

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## ***Energy Savings Performance Contracts***

The Integrated Approach to  
Upgrading EPA's NVFEL  
*Ann Arbor, Michigan*



## ***Ann Arbor, MI NVFEL Lab***

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June 3-6, 2001

[www.energy2001.ee.doe.gov](http://www.energy2001.ee.doe.gov)



## ***NVFE L: Background***

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- 135,000-square-foot high-bay testing lab
- Requires ventilation, high heat loads
- Highest EPA energy consumer (BTU/sf)
  - 2.5 MW/year
  - \$1 million/year in energy costs
- Potential showcase facility
- Insufficient funds to replace 30-year-old infrastructure through traditional means



## ***ESPCs: Alternative Financing Method***

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- Energy services company (ESCO) uses private funds to incorporate energy conservation measures in a federal building
  - Designs
  - Installs
  - Operates
  - Maintains
- No up-front capital investment from the government
- ESCO's investment repaid over time from resulting energy cost savings



## ***ESPCs: How They Work***

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- All ESPCs are firm-fixed-price contracts
- ESCO assumes risk for meeting guaranteed energy cost savings
- Payments
  - Made from funds that would have been used for energy and energy-related expenses
  - Annual total (to ESCO and utility) cannot exceed prior energy cost
  - Monthly payments begin after measures in place
- ESCO retains the rights to the equipment it installs until the end of the contract



## ***ESPCs: The Integrated Advantage***

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- In addition to saving energy, ESPCs save money for the government
  - Energy savings = cost savings
  - At today's energy prices, even higher savings
  - ESCO assumes O&M and repair costs
- Preferable to individually contracted projects
  - More costly
  - Time-consuming
  - Projects go undone if competing for limited funds



## ***Ann Arbor's ESPC Advantage***

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- Reduces energy, water, pollution, and costs
  - Electricity: 52% reduction projected
  - Water: 81% reduction projected
  - Emissions: CO<sub>2</sub>=57%; SO<sub>2</sub>=53%; NO<sub>x</sub>=54%
  - Utility costs: More than 50% (\$2 million to \$800,000)
- Helps meet federal energy reduction requirements
  - Energy Policy Act/Executive Order 12902
  - 20% by 2000; 30% by 2005; 35% by 2010
- Restores obsolete and aging infrastructure
  - All upgrades would not have been made without it
  - Would not be as successful if done piecemeal



## ***Ann Arbor ESPC Highlights***

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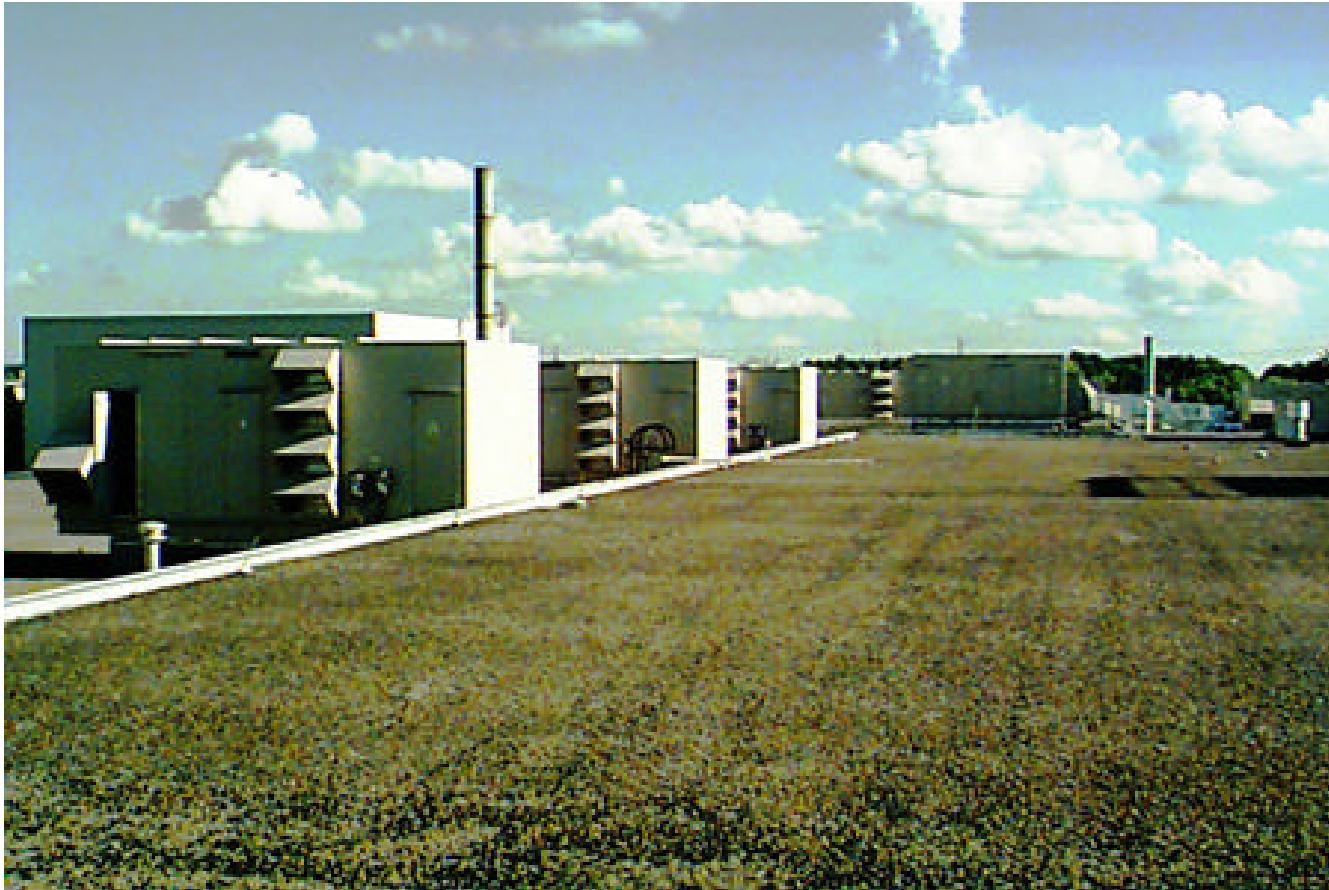
- \$10.6 million high-efficiency HVAC overhaul
  - 36 rooftop air handling units replace previous ones
  - Natural gas chiller/heaters improve efficiency and reduce reliance on electric utility
  - Absorbers revive a proven energy efficiency technology to provide both heat and cooling, replacing a steam boiler and electric chiller
  - Compact cooling tower uses less space
- 200-kilowatt natural gas fuel cell
- Double enthalpy recovery





## ***Rooftop Air Handling Units***

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## *Natural Gas Boiler*

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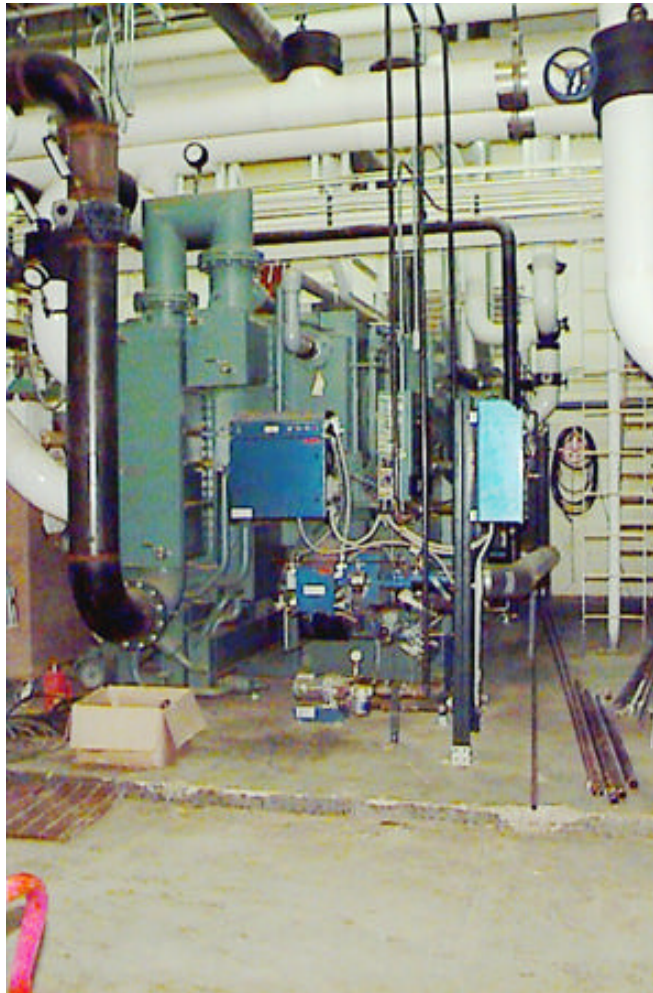
[www.energy2001.ee.doe.gov](http://www.energy2001.ee.doe.gov)

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## *Absorber*

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## ***Compact Cooling Tower***

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## ***200-kW Natural Gas Fuel Cell***

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## ***Double Enthalpy Recovery***

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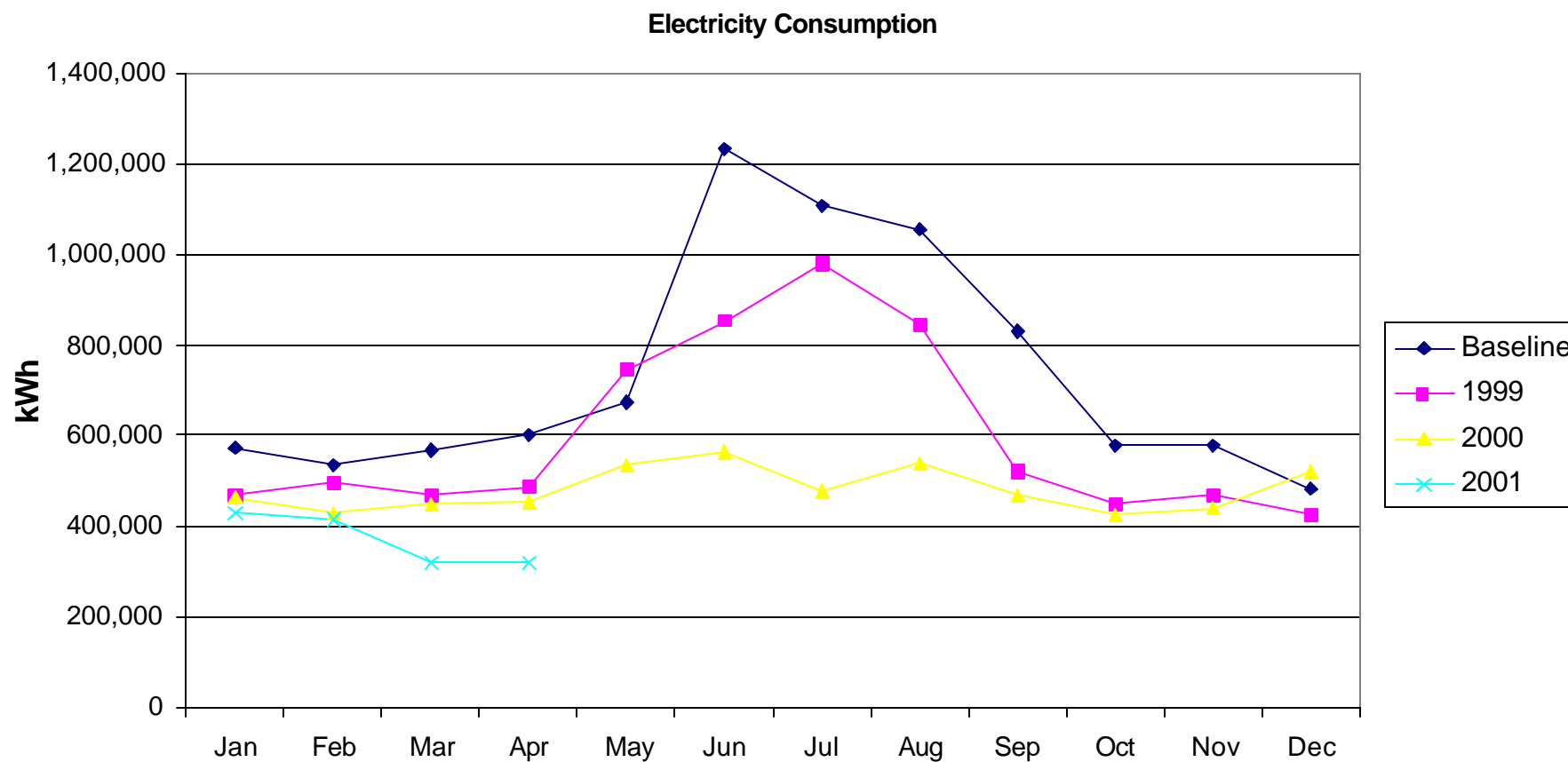
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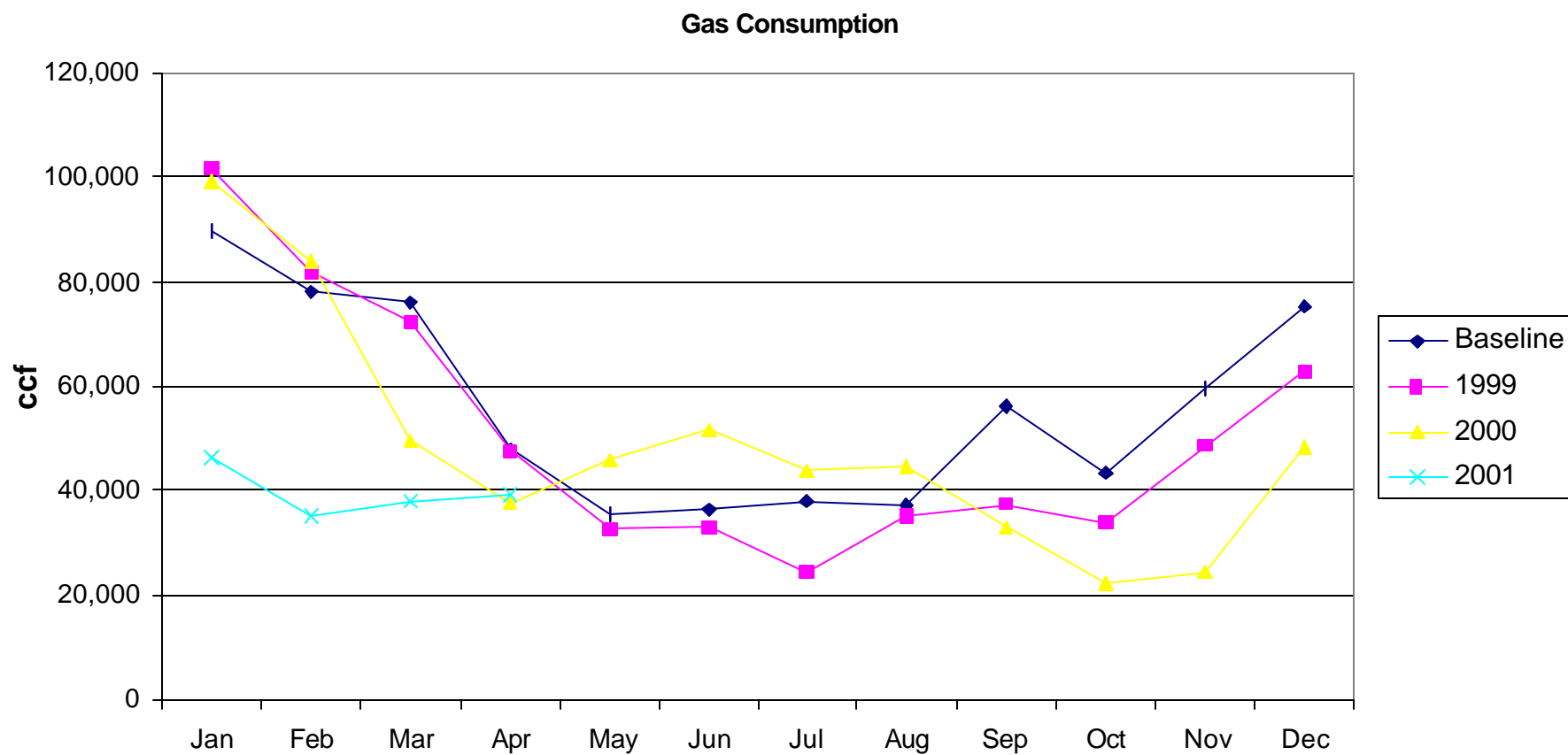


## NVFE L Electricity Use





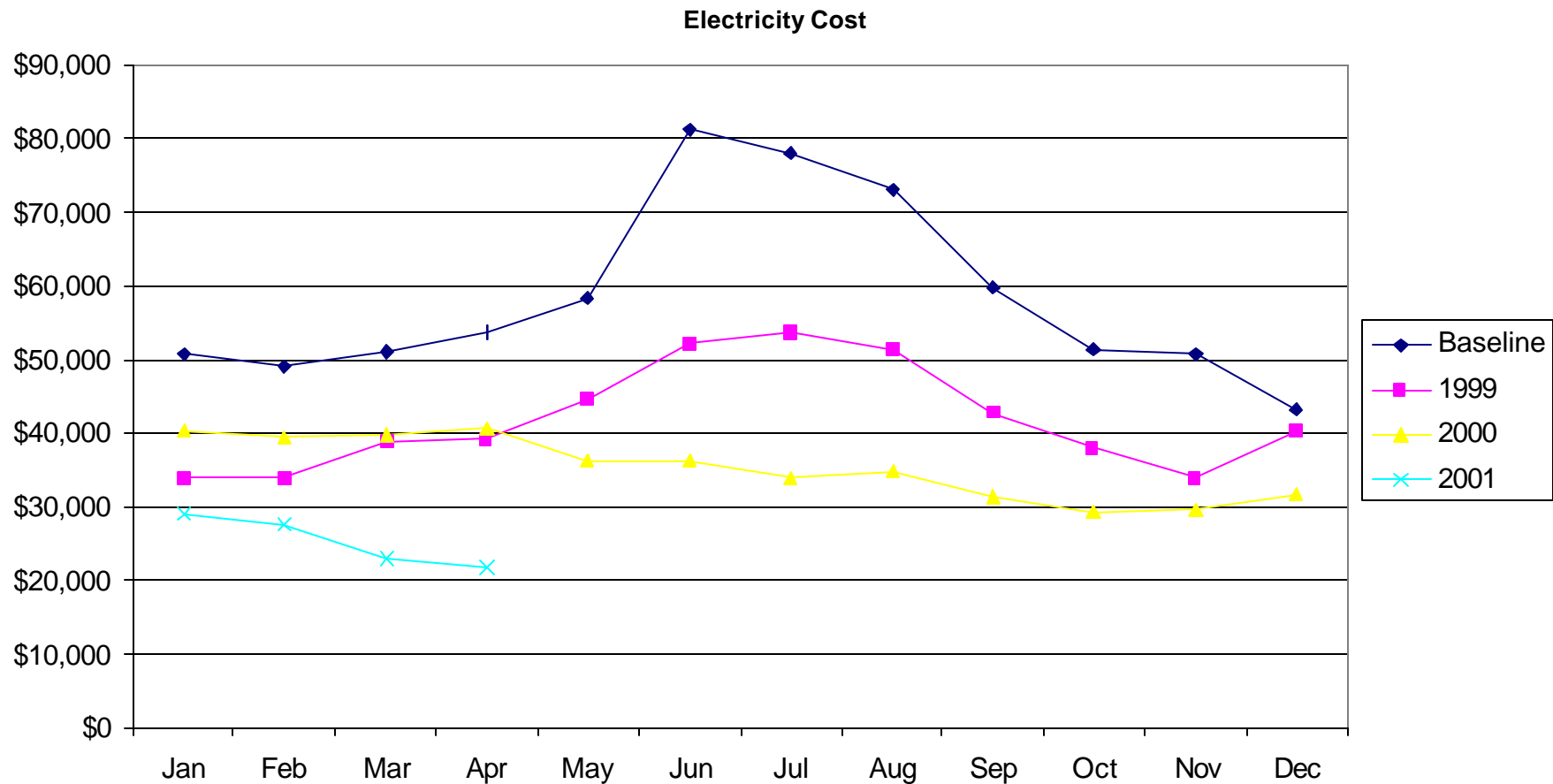
## NVFEL Natural Gas Use





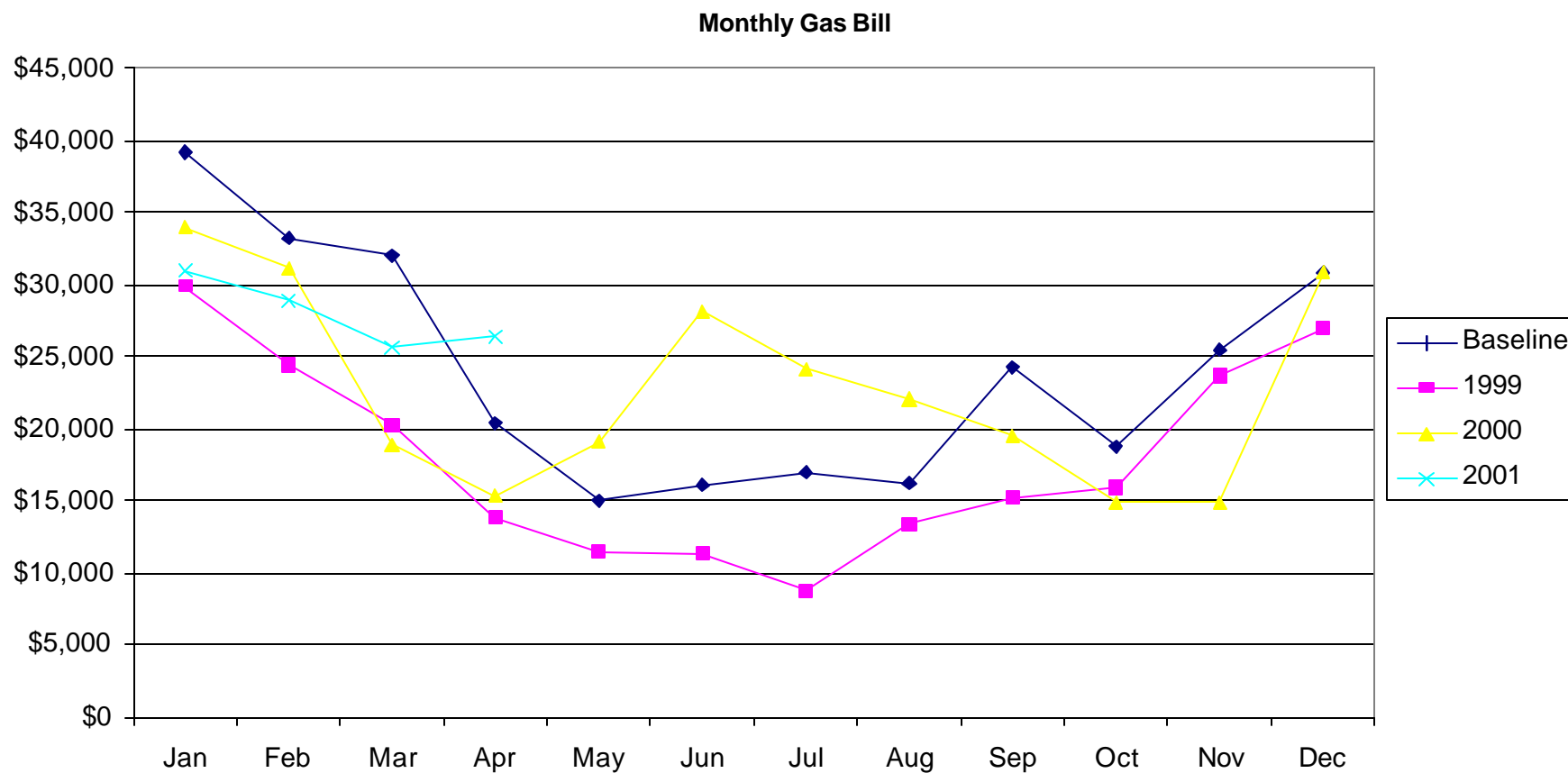


## NV F E L Electricity Costs





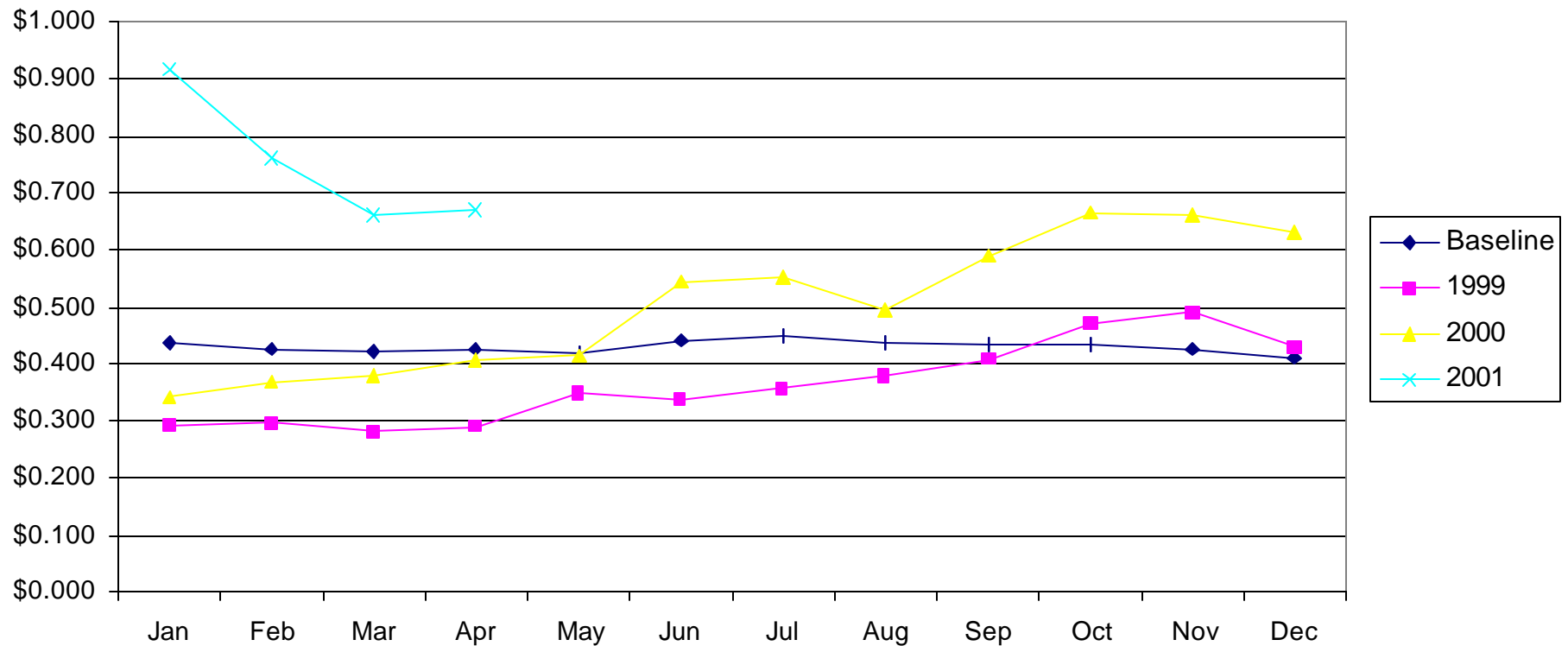
## NVFEL Natural Gas Costs





# NVFEL Natural Gas Prices

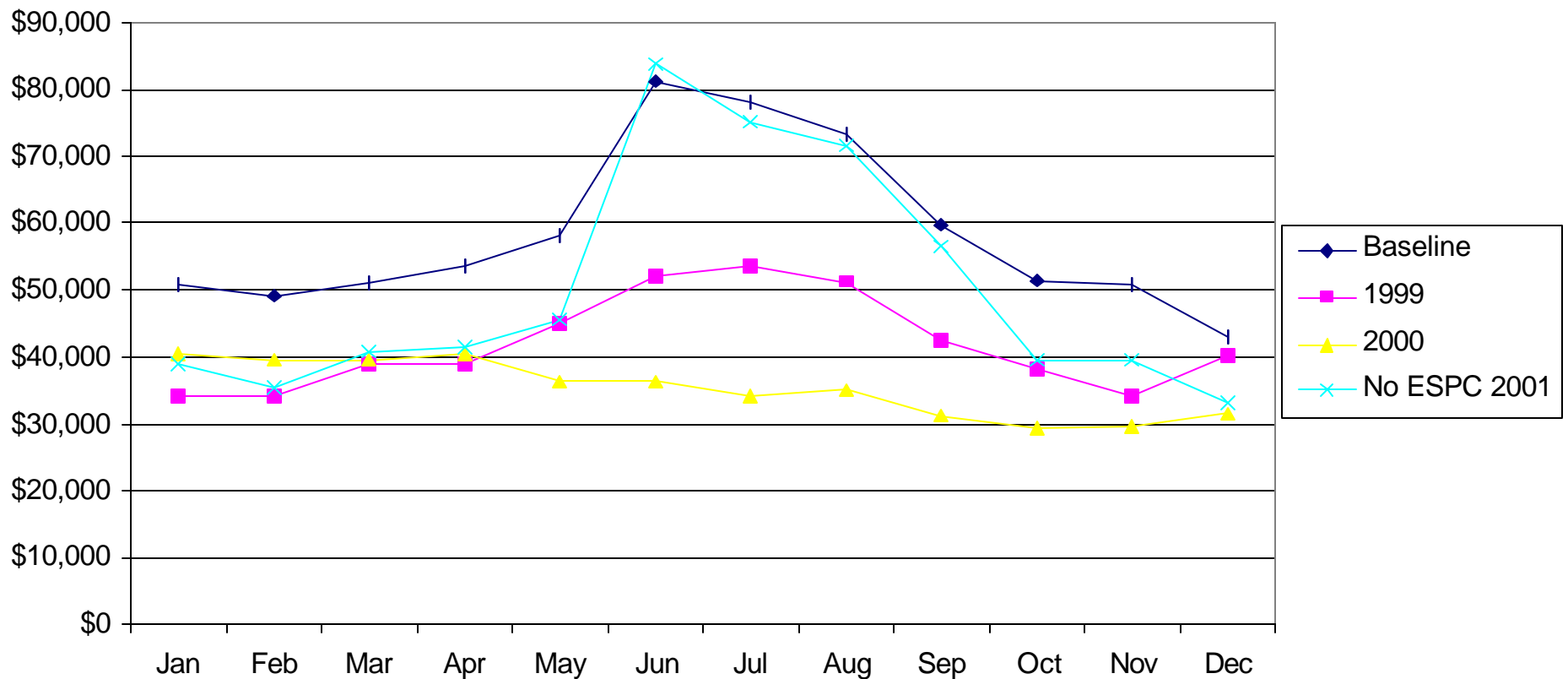
Cost/CCF Burnertip





## NV F E L Electricity Costs

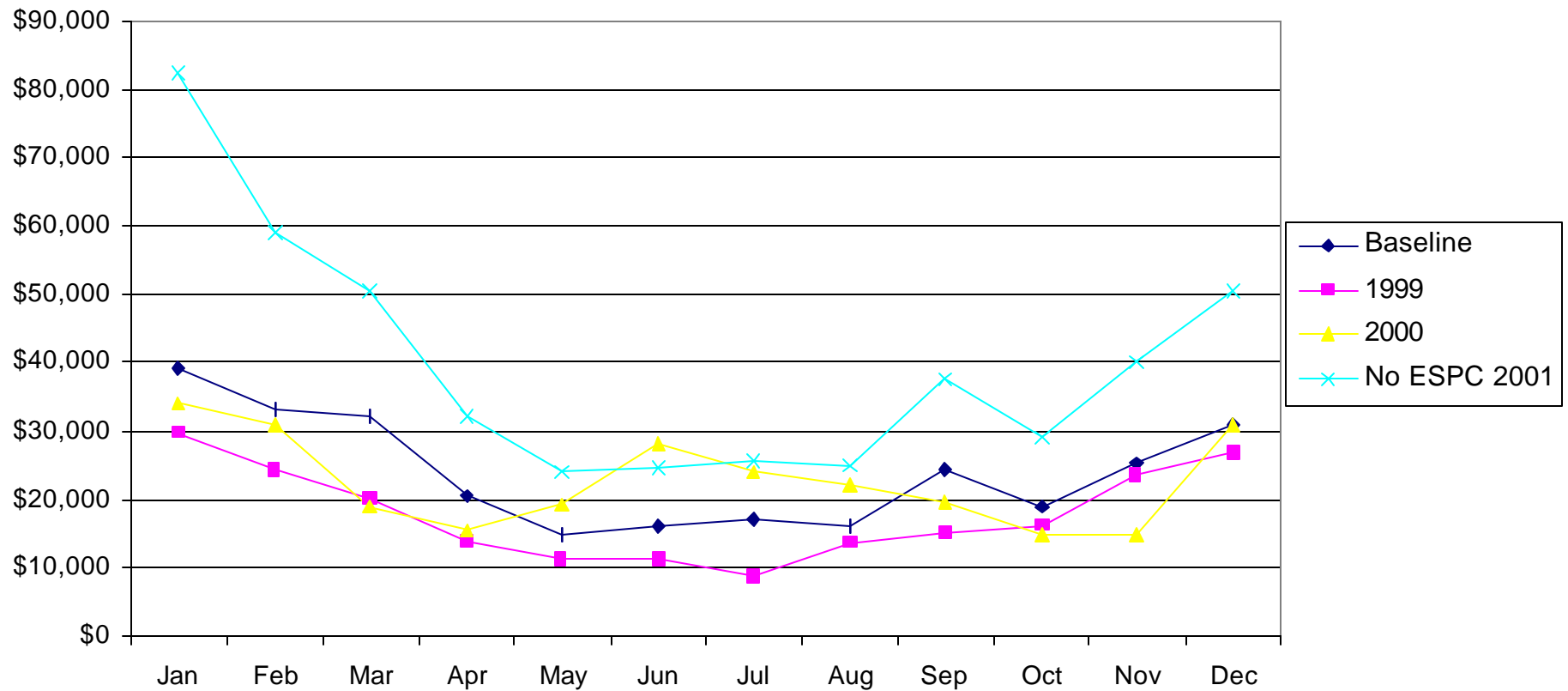
Electricity Costs Without an ESPC





# NVFEL Natural Gas Costs

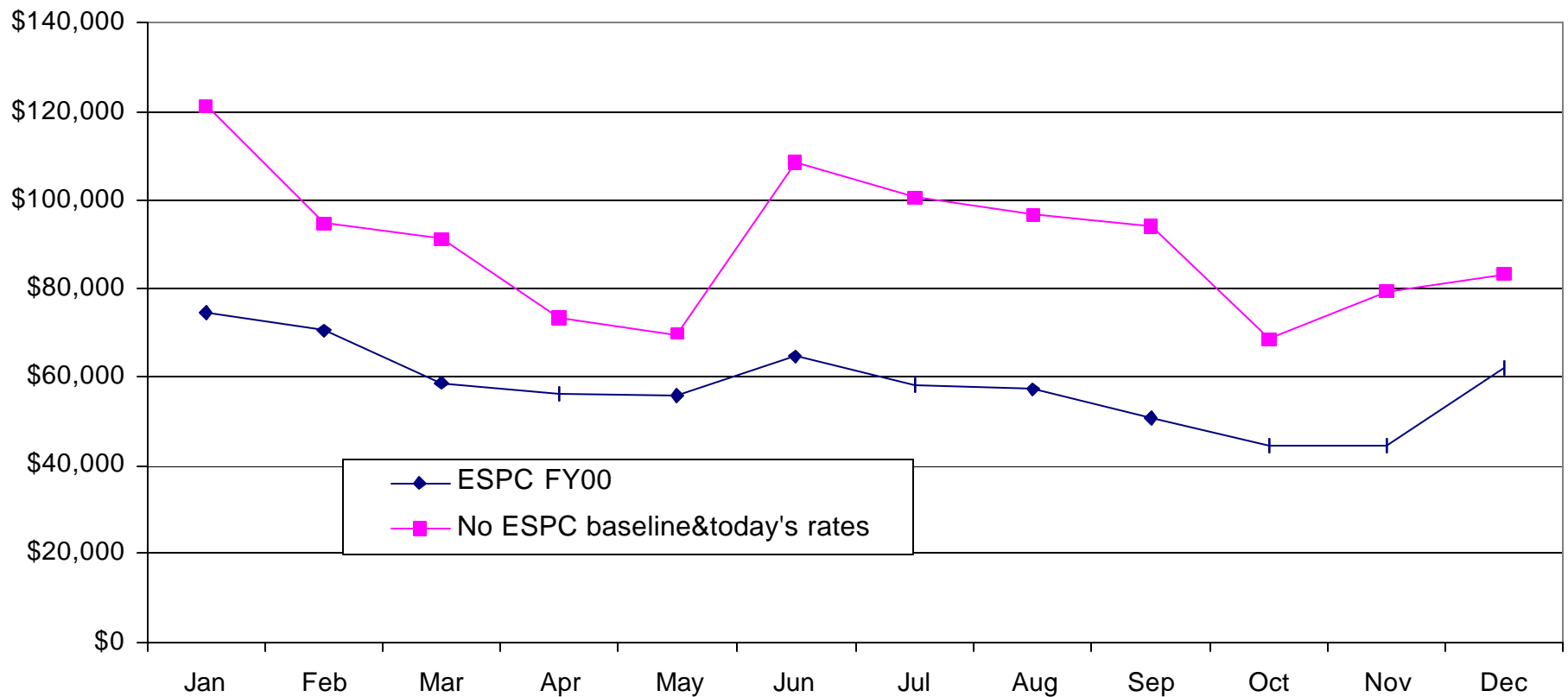
Monthly Gas Bill Without an ESPC





# NVFEL Total Energy Costs

Ann Arbor NVFEL Annual Energy Costs Without an ESPC





## ***Lessons Learned in Ann Arbor***

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- Think outside the box
  - Question conventional wisdom
  - Example: Dramatic savings resulted from recirculating air
- Be realistic in planning for downtime
  - Construction will disrupt operation
  - Many factors affect construction
    - Local labor market
    - Weather



## ***Lessons Learned, continued***

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- Communicate with customers
  - Employees need to know what, when, why, how long, and results
  - More buy-in = lower frustration levels
- Commit (human) resources to the project
  - Easy to underestimate the time needed
  - Spend a lot of time putting out fires
  - Leave time for employee outreach





## ***Future ESPCs: Ada, Oklahoma***

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- Replicate Ann Arbor in more traditional lab
- Using DOE's Super ESPC
- Shorter lead time
  - 16 months from project award to completion
  - Versus 30 months for Ann Arbor
- Drilling 175 geothermal wells (completed)
- Construction completion projected for January 2002
- Anticipated energy use reduction: 60%



## Ada, OK *ESPC Under Way*



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